[0007] FIG. 1 is a schematic illustrating the relationships among the nucleic acid moieties involved in the function of a saRNA of the disclosure.
[0008] FIG. 2 shows TMEM173 mRNA expressions in HepG2 cells treated with TMEM173-saRNAs.
[0009] FIG. 3 shows TMEM173 mRNA expressions in HepG2 cells treated with TMEM173-Pr-70, TMEM173-Pr-70-invAb-Se-m2, TMEM173-Pr-70-invAb-Se-m1, TMEM173-Pr-70-invAb-Se-0, TMEM173-Pr-70-invAb-Se-p1 and TMEM173-Pr-70-invAb-Se-p2.
[0010] FIG. 4 shows TMEM173 mRNA expressions in A549 cells treated with various TMEM173-saRNAs and controls.
[0011] FIG. 5A-5C show TMEM173 mRNA and TMEM173 protein level changes in A549 cells after treatment with TMEM173-saRNAs.
[0012] FIG. 6 shows TMEM173 mRNA expressions in A549 cells treated with TMEM173-Pr-70-invAb-Se-m1 and TMEM173-Pr-70-m1-emod51.
[0013] FIG. 7A-7C show TMEM173 mRNA changes in A549 cells after treatment with various doses of TMEM173-saRNAs at different times.

SUMMARY OF THE DISCLOSURE

[0014] The present disclosure provides synthetic isolated small activating RNAs (saRNAs) which up-regulate the expression of a target gene, wherein the target gene is TMEM173 (STING). In some examples, the saRNA comprises an antisense strand that is at least 80% complementary to a region on a targeted sequence of the target gene, wherein the targeted sequence is selected from the group consisting of SEQ ID NO:2-15, and wherein the antisense strand has 14-30 nucleotides. In one aspect, the present disclosure provides a synthetic isolated small activating RNA (saRNA) which up-regulates the expression of a target gene, wherein the target gene is TMEM173, wherein the saRNA comprises an antisense strand that is at least 80% complementary to a targeted sequence of the target gene, wherein the targeted sequence is selected from the group consisting of SEQ ID NO:2-15, and wherein the antisense strand has 14-30 nucleotides. Pharmaceutical compositions, kits, and devices comprising such saRNAs are also provided. In one aspect, the present disclosure provides a pharmaceutical composition comprising the saRNA as disclosed herein and at least one pharmaceutically acceptable excipient.
[0015] The present disclosure also provides methods of up-regulating the expression of a target gene in a subject, wherein the target gene is TMEM173 (STING). In one aspect, the present disclosure provides a method of up-regulating the expression of a target gene *in vitro*, wherein the target gene is TMEM173, comprising administering the saRNA as disclosed herein. In one aspect, the present disclosure provides use of the saRNA as disclosed herein in the manufacture of a medicament for up-regulating the expression of a target gene, wherein the target gene is TMEM173. Methods of modulating immune signaling pathways and methods of treating diseases associated with TMEM173 (such as but not limited to cancer) are also provided. The methods comprise administering saRNAs of the present disclosure to the subject. In one aspect, the disclosure provides use of the saRNA as disclosed herein or the pharmaceutical composition as disclosed herein in the manufacture of a medicament for treating cancer of a subject in need thereof.
[0016] The details of various examples of the disclosure are set forth in the description below. Other features, objects, and advantages of the disclosure will be apparent from the description and the drawings, and from the claims.